Fig. 1   C18:1 Frequencies
for 92EF (WSGA 1A X Q0508)
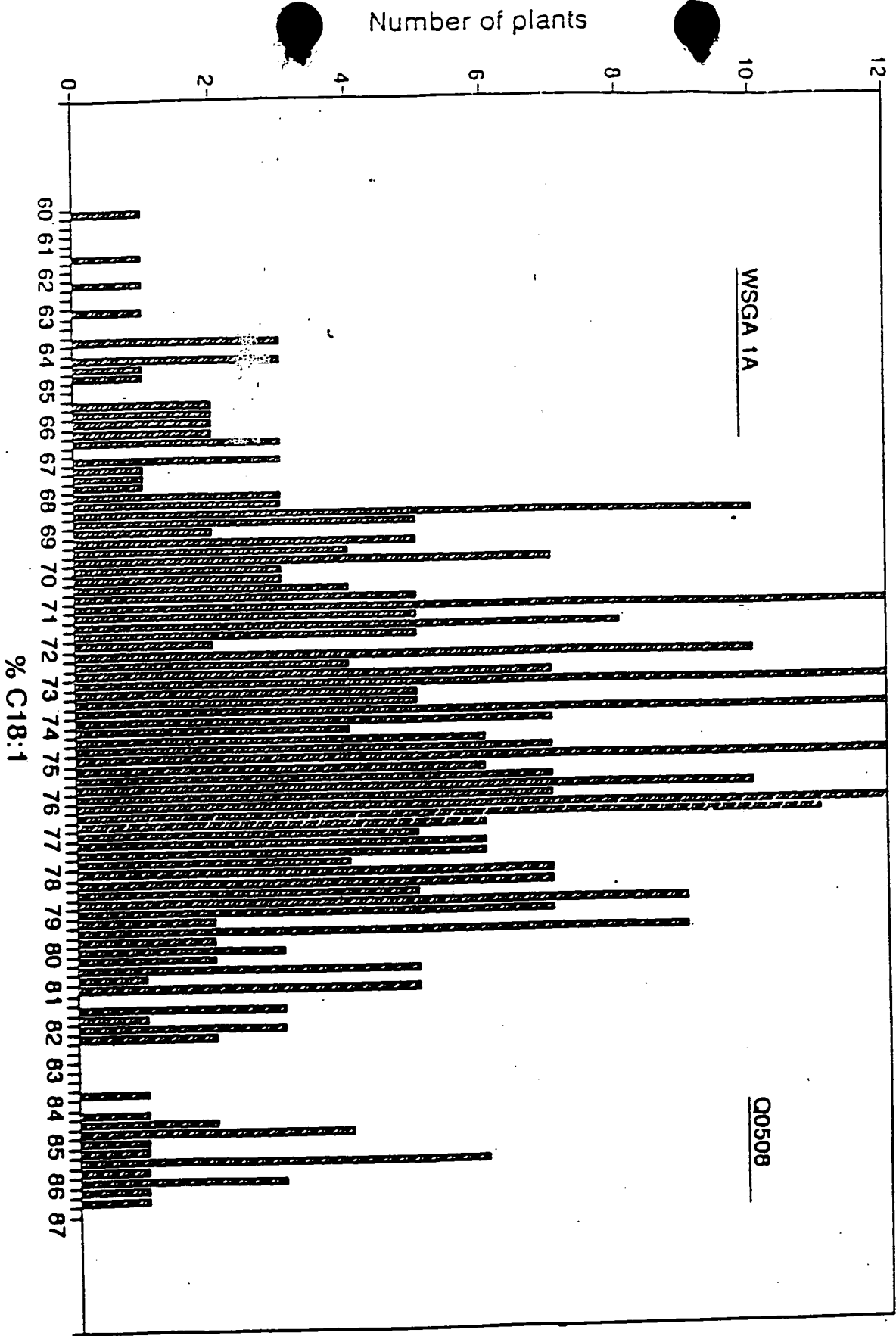
```
                  10            20            30            40
   1  ATGGGTGCAGGTGG●AGAATGCAAGTGTCTCCTC●CTCCA  Fad2-D wt
   1  ATGGGTGCAGGTGGAAGAATGCAAGTGTCTCCTCCCTCCA  Fad2-D (GA316) IMC129
   1  ATGGGTGCAGGTGGAAGAATGCAAGTGTCTCCTCCCTCCA  Fad2-F wt
   1  ATGGGTGCAGGTGGAAGAATGCAAGTGTCTCCTCCCTCCA  Fad2-F (TA515) Q508
   1  ATGGGTGCAGGTGGAAGAATGCAAGTGTCTCCTCCCTCCA  Fad2-F (GA908) Q4275

                  50            60            70            80
  41  AAAAGTCTGAAACCGACAACATCAAGCGCGTACCCTGCGA  Fad2-D wt
  41  AAAAGTCTGAAACCGACAACATCAAGCGCGTACCCTGCGA  Fad2-D (GA316) IMC129
  41  AGAAGTCTGAAACCGACACCATCAAGCGCGTACCCTGCGA  Fad2-F wt
  41  AGAAGTCTGAAACCGACACCATCAAGCGCGTACCCTGCGA  Fad2-F (TA515) Q508
  41  AGAAGTCTGAAACCGACACCATCAAGCGCGTACCCTGCGA  Fad2-F (GA908) Q4275

                  90           100           110           120
  81  GACACCGCCCTTCACTGTCGGAGAACTCAAGAAAGCAATC  Fad2-D wt
  81  GACACCGCCCTTCACTGTCGGAGAACTCAAGAAAGCAATC  Fad2-D (GA316) IMC129
  81  GACACCGCCCTTCACTGTCGGAGAACTCAAGAAAGCAATC  Fad2-F wt
  81  GACACCGCCCTTCACTGTCGGAGAACTCAAGAAAGCAATC  Fad2-F (TA515) Q508
  81  GACACCGCCCTTCACTGTCGGAGAACTCAAGAAAGCAATC  Fad2-F (GA908) Q4275

                 130           140           150           160
 121  CCACCGCACTGTTTCAAACGCTCGATCCCTCGCTCTTTCT  Fad2-D wt
 121  CCACCGCACTGTTTCAAACGCTCGATCCCTCGCTCTTTCT  Fad2-D (GA316) IMC129
 121  CCACCGCACTGTTTCAAACGCTCGATCCCTCGCTCTTTCT  Fad2-F wt
 121  CCACCGCACTGTTTCAAACGCTCGATCCCTCGCTCTTTCT  Fad2-F (TA515) Q508
 121  CCACCGCACTGTTTCAAACGCTCGATCCCTCGCTCTTTCT  Fad2-F (GA908) Q4275

                 170           180           190           200
 161  CCTACCTCATCTGGGACATCATCATAGCCTCCTGCTTCTA  Fad2-D wt
 161  CCTACCTCATCTGGGACATCATCATAGCCTCCTGCTTCTA  Fad2-D (GA316) IMC129
 161  CCTACCTCATCTGGGACATCATCATAGCCTCCTGCTTCTA  Fad2-F wt
 161  CCTACCTCATCTGGGACATCATCATAGCCTCCTGCTTCTA  Fad2-F (TA515) Q508
 161  CCTACCTCATCTGGGACATCATCATAGCCTCCTGCTTCTA  Fad2-F (GA908) Q4275

                 210           220           230           240
 201  CTACGTCGCCACCACTTACTTCCCTCTCCTCCCTCACCCT  Fad2-D wt
 201  CTACGTCGCCACCACTTACTTCCCTCTCCTCCCTCACCCT  Fad2-D (GA316) IMC129
 201  CTACGTCGCCACCACTTACTTCCCTCTCCTCCCTCACCCT  Fad2-F wt
 201  CTACGTCGCCACCACTTACTTCCCTCTCCTCCCTCACCCT  Fad2-F (TA515) Q508
 201  CTACGTCGCCACCACTTACTTCCCTCTCCTCCCTCACCCT  Fad2-F (GA908) Q4275

                 250           260           270           280
 241  CTCTCCTACTTCGCCTGGCCTCTCTACTGGGCCTGCCAGG  Fad2-D wt
 241  CTCTCCTACTTCGCCTGGCCTCTCTACTGGGCCTGCCAGG  Fad2-D (GA316) IMC129
 241  CTCTCCTACTTCGCCTGGCCTCTCTACTGGGCCTGCCAAG  Fad2-F wt
 241  CTCTCCTACTTCGCCTGGCCTCTCTACTGGGCCTGCCAAG  Fad2-F (TA515) Q508
 241  CTCTCCTACTTCGCCCTGGCCTCTCTACTGGGCCTGCCAAG  Fad2-F (GA908) Q4275
```

FIG. 2A

```
                    290            300            310            320
281  G C T G C G T C C T A A C C ⬤ G C G T C T G G G T C A T A G C C C A ⬤ G A C T G   Fad2-D wt
281  G C T G C G T C C T A A C C G G C G T C T G G G T C A T A G C C C A C A A G T G   Fad2-D (GA316) IMC129
281  G G T G C G T C C T A A C C G G C G T C T G G G T C A T A G C C C A C G A G T G   Fad2-F wt
281  G G T G C G T C C T A A C C C G G C G T C T G G G T C A T A G C C C A C G A G T G   Fad2-F (TA515) Q508
281  G G T G C G T C C T A A C C G G C G T C T G G G T C A T A G C C C A C G A G T G   Fad2-F (GA908) Q4275


                    330            340            350            360
321  C G G C C A C C A C G C C T T C A G C G A C T A C C A G T G G C T G G A C G A C   Fad2-D wt
321  C G G C C A C C A C G C C T T C A G C G A C T A C C A G T G G C T G C A C G A C   Fad2-D (GA316) IMC129
321  C G G C C A C C A C G C C T T C A G C G A C T A C C A G T G G C T T G A C G A C   Fad2-F wt
321  C G G C C A C C A C G C C T T C A G C G A C T A C C A G T G G C T T G A C G A C   Fad2-F (TA515) Q508
321  C G G C C A C C A C G C C T T C A G C G A C T A C C A G T G G C T T G A C G A C   Fad2-F (GA908) Q4275


                    370            380            390            400
361  A C C G T C G G C C T C A T C T T C C A C T C C T T C C T C C T C G T C C C T T   Fad2-D wt
361  A C C G T C G G C C T C A T C T T C C A C T C C T T C C T C C T C G T C C C T T   Fad2-D (GA316) IMC129
361  A C C G T C G G T C T C A T C T T C C A C T C C T T C C T C C T C G T C C C T T   Fad2-F wt
361  A C C G T C G G T C T C A T C T T C C A C T C C T T C C T C C T C G T C C C T T   Fad2-F (TA515) Q508
361  A C C G T C G G T C T C A T C T T C C A C T C C T T C C T C C T C G T C C C T T   Fad2-F (GA908) Q4275


                    410            420            430            440
401  A C T T C T C C T G G A A G T A C A G T C A T C G A C G C C A C C A T T C C A A   Fad2-D wt
401  A C T T C T C C T G G A A G T A C A G T C A T C G A C G C C A C C A T T C C A A   Fad2-D (GA316) IMC129
401  A C T T C T C C T G G A A G T A C A G T C A T C G A C G C C A C C A T T C C A A   Fad2-F wt
401  A C T T C T C C T G G A A G T A C A G T C A T C G A C G C C A C C A T T C C A A   Fad2-F (TA515) Q508
401  A C T T C T C C T G G A A G T A C A G T C A T C G A C G C C A C C A T T C C A A   Fad2-F (GA908) Q4275


                    450            460            470            480
441  C A C T G G C T C C C T C G A G A G A G A C G A A G T G T T T G T C C C C A A G   Fad2-D wt
441  C A C T G G C T C C C T C G A G A G A G A C G A A G T G T T T G T C C C C A A G   Fad2-D (GA316) IMC129
441  C A C T G G C T C C C T C G A G A G A G A C G A A G T G T T T G T C C C C A A G   Fad2-F wt
441  C A C T G G C T C C C T C G A G A G A G A C G A A G T G T T T G T C C C C A A G   Fad2-F (TA515) Q508
441  C A C T G G C T C C C T C G A G A G A G A C G A A G T G T T T G T C C C C A A G   Fad2-F (GA908) Q4275


                    490            500            510            520
481  A A G A A G T C A G A C A T C A A G T G G T A C G G C A A G T A C C T C A A C A   Fad2-D wt
481  A A G A A G T C A G A C A T C A A G T G G T A C G G C A A G T A C C T C A A C A   Fad2-D (GA316) IMC129
481  A A G A A G T C A G A C A T C A A G T G G T A C G G C A A G T A C C T C A A C A   Fad2-F wt
481  A A G A A G T C A G A C A T C A A G T G G T A C G G C A A G T A C C A C A A C A   Fad2-F (TA515) Q508
481  A A G A A G T C A G A C A T C A A G T G G T A C G G C A A G T A C C T C A A C A   Fad2-F (GA908) Q4275


                    530            540            550            560
521  A C C C T T T G G G A C G C A C C G T G A T G T T A A C G G T T C A G T T C A C   Fad2-D wt
521  A C C C T T T G G G A C G C A C C G T G A T G T T A A C G G T T C A G T T C A C   Fad2-D (GA316) IMC129
521  A C C C T T T G G G A C G C A C C G T G A T G T T A A C G G T T C A G T T C A C   Fad2-F wt
521  A C C C T T T G G G A C G C A C C G T G A T G T T A A C G G T T C A G T T C A C   Fad2-F (TA515) Q508
521  A C C C T T T G G G A C G C A C C G T G A T G T T A A C G G T T C A G T T C A C   Fad2-F (GA908) Q4275
```

FIG. 2B

```
                  570 ·            580            590              600
        ┌─────────────────────●──────────────────────────────●──────────┐
561  T C T C G G C T G G C C T T  G T A C T T A G C C T T C A A C G T   C G G G G  Fad2-D wt
561  T C T C G G C T G G C C T T T G T A C T T A G C C T T C A A C G T C T C G G G G  Fad2-D (GA316) IMC129
561  T C T C G G C T G G C C G T T G T A C T T A G C C T T C A A C G T C T C G G G A  Fad2-F wt
561  T C T C G G C T G G C C G T T G T A C T T A G C C T T C A A C G T C T C G G G A  Fad2-F (TA515) Q508
561  T C T C G G C T G G C C G T T G T A C T T A G C C T T C A A C G T C T C G G G A  Fad2-F (GA908) Q4275

                  610            620            630              640
        ┌──────────────────────────────────────────────────────────────┐
601  A G A C C T T A C G A C G G C G G C T T C G C T T G C C A T T T C C A C C C C A  Fad2-D wt
601  A G A C C T T A C G A C G G C G G C T T C G C T T G C C A T T T C C A C C C C A  Fad2-D (GA316) IMC129
601  A G A C C T T A C G A C G G C G G C T T C G C T T G C C A T T T C C A C C C C A  Fad2-F wt
601  A G A C C T T A C G A C G G C G G C T T C G C T T G C C A T T T C C A C C C C A  Fad2-F (TA515) Q508
601  A G A C C T T A C G A C G G C G G C T T C G C T T G C C A T T T C C A C C C C A  Fad2-F (GA908) Q4275

                  650            660            670              680
        ┌──────────────────────────────────────────────────────────────┐
641  A C G C T C C C A T C T A C A A C G A C C G T G A C C G T C T C C A G A T A T A  Fad2-D wt
641  A C G C T C C C A T C T A C A A C G A C C G T G A G C G T C T C C A G A T A T A  Fad2-D (GA316) IMC129
641  A C G C T C C C A T C T A C A A C G A C C G C G A G C G T C T C C A G A T A T A  Fad2-F wt
641  A C G C T C C C A T C T A C A A C G A C C G C G A G C G T C T C C A G A T A T A  Fad2-F (TA515) Q508
641  A C G C T C C C A T C T A C A A C G A C C G C G A G C G T C T C C A G A T A T A  Fad2-F (GA908) Q4275

                  690            700            710              720
        ┌──────────────────────────────────────────────────────────────┐
681  C A T C T C C G A C G C T G G C A T C C T C G C C G T C T G C T A C G G T C T C  Fad2-D wt
681  C A T C T C C G A C G C T G G C A T C C T C G C C G T C T G C T A C G G T C T C  Fad2-D (GA316) IMC129
681  C A T C T C C G A C G C T G G C A T C C T C G C C G T C T G C T A C G G T C T C  Fad2-F wt
681  C A T C T C C G A C G C T G G C A T C C T C G C C G T C T G C T A C G G T C T C  Fad2-F (TA515) Q508
681  C A T C T C C G A C G C T G G C A T C C T C G C C G T C T G C T A C G G T C T C  Fad2-F (GA908) Q4275

                  730            740            750              760
        ┌──────────────────────────────────────────────────────────────┐
721  T A C C G C T A C G C T G C T G T C C A A G G A G T T G C C T C G A T G G T C T  Fad2-D wt
721  T A C C G C T A C G C T G C T G T C C A A G G A G T T G C C T C G A T G G T C T  Fad2-D (GA316) IMC129
721  T T C C G T T A C G C C G C C G C G C A G G G A G T G G C C T C G A T G G T C T  Fad2-F wt
721  T T C C G T T A C G C C G C C G C G C A G G G A G T G G C C T C G A T G G T C T  Fad2-F (TA515) Q508
721  T T C C G T T A C G C C G C C G C G C A G G G A G T G G C C T C G A T G G T C T  Fad2-F (GA908) Q4275

                  770            780            790              800
        ┌──────────────────────────────────────────────────────────────┐
761  G C T T C T A C G G A G T T C C T C T T C T G A T T G T C A A C G G G T T C T T  Fad2-D wt
761  G C T T C T A C G G A G T T C C T C T T C T G A T T G T C A A C G G G T T C T T  Fad2-D (GA316) IMC129
761  G C T T C T A C G G A G T C C C G C T T C T G A T T G T C A A T G G T T T C C T  Fad2-F wt
761  G C T T C T A C G G A G T C C C G C T T C T G A T T G T C A A T G G T T T C C T  Fad2-F (TA515) Q508
761  G C T T C T A C G G A G T C C C G C T T C T G A T T G T C A A T G G T T T C C T  Fad2-F (GA908) Q4275

                  810            820            830              840
        ┌──────────────────────────────────────────────────────────────┐
801  A G T T T T G A T C A C T T A C T T G C A G C A C A C G C A T C C T T C C C T G  Fad2-D wt
801  A G T T T T G A T C A C T T A C T T G C A G C A C A C G C A T C C T T C C C T G  Fad2-D (GA316) IMC129
801  C G T G T T G A T C A C T T A C T T G C A G C A C A C G C A T C C T T C C C T G  Fad2-F wt
801  C G T G T T G A T C A C T T A C T T G C A G C A C A C G C A T C C T T C C C T G  Fad2-F (TA515) Q508
801  C G T G T T G A T C A C T T A C T T G C A G C A C A C G C A T C C T T C C C T G  Fad2-F (GA908) Q4275
```

FIG. 2C

```
                      850                 860               870                 880
841  C C T C A C T A T G A C T C G T C T G A G T G G G A T T G G T T G A G G G G A G   Fad2-D wt
841  C C T C A C T A T G A C T C G T C T G A G T G G G A T T G G T T G A G G G G A G   Fad2-D (GA316) IMC129
841  C C T C A C T A C G A T T C G T C C G A G T G G G A T T G G T T G A G G G G A G   Fad2-F wt
841  C C T C A C T A C G A T T C C T C C G A C T G C G A T T C G T T G A G G G G A G   Fad2-F (TA515) Q508
841  C C T C A C T A C G A T T C G T C C G A G T G G G A T T G G T T G A G G G G A G   Fad2-F (GA908) Q4275


                      890                 900               910                 920
881  C T T T G G C C A C C G T T G A C A G A G A C T A C G G A A T C T T G A A C A A   Fad2-D wt
881  C T T T G G C C A C C G T T G A C A G A G A C T A C G G A A T C T T G A A C A A   Fad2-D (GA316) IMC129
881  C T T T G G C T A C C G T T G A C A G A G A C T A C G G A A T C T T G A A C A A   Fad2-F wt
881  C T T T G G C T A C C G T T G A C A G A G A C T A C G G A A T C T T G A A C A A   Fad2-F (TA515) Q508
881  C T T T G G C T A C C G T T G A C A G A G A C T A C G A A A T C T T G A A C A A   Fad2-F (GA908) Q4275


                      930                 940               950                 960
921  G G T C T T C C A C A A T A T C A C G G A C A C G C A C G T G G C G C A T C A C   Fad2-D wt
921  G G T C T T C C A C A A T A T C A C G G A C A C G C A C G T G G C G C A T C A C   Fad2-D (GA316) IMC129
921  G G T C T T C C A C A A T A T T A C C G A C A C G C A C G T G G C G C A T C A T   Fad2-F wt
921  G G T C T T C C A C A A T A T T A C C G A C A C G C A C G T G G C G C A T C A T   Fad2-F (TA515) Q508
921  G G T C T T C C A C A A T A T T A C C G A C A C G C A C G T G G C G C A T C A T   Fad2-F (GA908) Q4275


                      970                 980               990                 1000
961  C T G T T C T C G A C C A T G C C G C A T T A T C A T G C G A T G G A A G C T A   Fad2-D wt
961  C T G T T C T C G A C C A T G C C G C A T T A T C A T G C G A T G G A A G C T A   Fad2-D (GA316) IMC129
961  C T G T T C T C C A C G A T G C C G C A T T A T C A C G C G A T G G A A G C T A   Fad2-F wt
961  C T G T T C T C C A C G A T G C C G C A T T A T C A C G C G A T G G A A G C T A   Fad2-F (TA515) Q508
961  C T G T T C T C C A C G A T G C C G C A T T A T C A C G C G A T G G A A G C T A   Fad2-F (GA908) Q4275


                      1010                1020              1030                1040
1001 C G A A G G C G A T A A A G C C G A T A C T G G G A G A G T A T T A T C A G T T   Fad2-D wt
1001 C G A A G G C G A T A A A G C C G A T A C T G G G A G A G T A T T A T C A G T T   Fad2-D (GA316) IMC129
1001 C C A A G G C G A T A A A G C C G A T A C T G G G A G A G T A T T A T C A G T T   Fad2-F wt
1001 C C A A G G C G A T A A A G C C G A T A C T G G G A G A G T A T T A T C A G T T   Fad2-F (TA515) Q508
1001 C C A A G G C G A T A A A G C C G A T A C T G G G A G A G T A T T A T C A G T T   Fad2-F (GA908) Q4275


                      1050                1060              1070                1080
1041 C G A T G G G A C G C C G G T G G T T A A G G C G A T G T G G A G G G A G G C G   Fad2-D wt
1041 C G A T G G G A C G C C C G T G G T T A A G G C G A T G T G G A G G G A G G C G   Fad2-D (GA316) IMC129
1041 C G A T G G G A C G C C G G T G G T T A A G G C G A T G T G G A G G G A G G C G   Fad2-F wt
1041 C G A T G G G A C G C C G G T G G T T A A G G C G A T G T G G A G G G A G G C G   Fad2-F (TA515) Q508
1041 C G A T G G G A C G C C G G T G G T T A A G G C G A T G T G G A G G G A G G C G   Fad2-F (GA908) Q4275


                      1090                1100              1110                1120
1081 A A G G A G T G T A T C T A T G T G G A A C C G G A C A G G C A A G G T G A G A   Fad2-D wt
1081 A A G G A G T G T A T C T A T G T G G C A A C C G G A C A G G C A A G G T G A G A   Fad2-D (GA316) IMC129
1081 A A G G A G T G T A T C T A T G T G G A A C C G G A C A G G C A A G G T G A G A   Fad2-F wt
1081 A A G G A G T G T A T C T A T G T G G A A C C G G A C A G G C A A G G T G A G A   Fad2-F (TA515) Q508
1081 A A G G A G T G T A T C T A T G T G G A A C C G G A C A G G C A A G G T G A G A   Fad2-F (GA908) Q4275
```

FIG. 2D

```
                    1130                 1140                 1150
1121 A G A A A G G T G T G T T C   G G T A C A A C A A T A A G T T A T    A      Fad2-D wt
1121 A G A A A G G T G T G T T C T G G T A C A A C A A T A A G T T A T G A       Fad2-D (GA316) TMG129
1121 A G A A A G G T G T G T T C T G G T A C A A C A A T A A G T T A T G A       Fad2-F wt
1121 A G A A A G G T G T G T T C T G G T A C A A C A A T A A G T T A T C A       Fad2-F (TA515) Q508
1121 A G A A A G G T G T G T T C T G G T A C A A C A A T A A G T T A T G A       Fad2-F (GA908) Q4275
```

FIG. 2E

									10										20		

```
       ●                         10                          ●              20
1   Met Gly Ala Gly Gly Arg Met Gln Val Ser Pro Pro Ser Lys Lys Ser Glu Thr Asp Asn   Fad2-D wt
1   Met Gly Ala Gly Gly Arg Met Gln Val Ser Pro Pro Ser Lys Lys Ser Glu Thr Asp Asn   Fad2-D (GA316) IMC129
1   Met Gly Ala Gly Gly Arg Met Gln Val Ser Pro Pro Ser Lys Lys Ser Glu Thr Asp Thr   Fad2-F wt
1   Met Gly Ala Gly Gly Arg Met Gln Val Ser Pro Pro Ser Lys Lys Ser Glu Thr Asp Thr   Fad2-F (TA515) Q508
1   Met Gly Ala Gly Gly Arg Met Gln Val Ser Pro Pro Ser Lys Lys Ser Glu Thr Asp Thr   Fad2-F (GA908) Q4275


                                 30                                          40
61  Ile Lys Arg Val Pro Cys Glu Thr Pro Pro Phe Thr Val Gly Glu Leu Lys Lys Ala Ile   Fad2-D wt
61  Ile Lys Arg Val Pro Cys Glu Thr Pro Pro Phe Thr Val Gly Glu Leu Lys Lys Ala Ile   Fad2-D (GA316) IMC129
61  Ile Lys Arg Val Pro Cys Glu Thr Pro Pro Phe Thr Val Gly Glu Leu Lys Lys Ala Ile   Fad2-F wt
61  Ile Lys Arg Val Pro Cys Glu Thr Pro Pro Phe Thr Val Gly Glu Leu Lys Lys Ala Ile   Fad2-F (TA515) Q508
61  Ile Lys Arg Val Pro Cys Glu Thr Pro Pro Phe Thr Val Gly Glu Leu Lys Lys Ala Ile   Fad2-F (GA908) Q4275


                                 50                                          60
121 Pro Pro His Cys Phe Lys Arg Ser Ile Pro Arg Ser Phe Ser Tyr Leu Ile Trp Asp Ile   Fad2-D wt
121 Pro Pro His Cys Phe Lys Arg Ser Ile Pro Arg Ser Phe Ser Tyr Leu Ile Trp Asp Ile   Fad2-D (GA316) IMC129
121 Pro Pro His Cys Phe Lys Arg Ser Ile Pro Arg Ser Phe Ser Tyr Leu Ile Trp Asp Ile   Fad2-F wt
121 Pro Pro His Cys Phe Lys Arg Ser Ile Pro Arg Ser Phe Ser Tyr Leu Ile Trp Asp Ile   Fad2-F (TA515) Q508
121 Pro Pro His Cys Phe Lys Arg Ser Ile Pro Arg Ser Phe Ser Tyr Leu Ile Trp Asp Ile   Fad2-F (GA908) Q4275


                                 70                                          80
181 Ile Ile Ala Ser Cys Phe Tyr Tyr Val Ala Thr Thr Tyr Phe Pro Leu Leu Pro His Pro   Fad2-D wt
181 Ile Ile Ala Ser Cys Phe Tyr Tyr Val Ala Thr Thr Tyr Phe Pro Leu Leu Pro His Pro   Fad2-D (GA316) IMC129
181 Ile Ile Ala Ser Cys Phe Tyr Tyr Val Ala Thr Thr Tyr Phe Pro Leu Leu Pro His Pro   Fad2-F wt
181 Ile Ile Ala Ser Cys Phe Tyr Tyr Val Ala Thr Thr Tyr Phe Pro Leu Leu Pro His Pro   Fad2-F (TA515) Q508
181 Ile Ile Ala Ser Cys Phe Tyr Tyr Val Ala Thr Thr Tyr Phe Pro Leu Leu Pro His Pro   Fad2-F (GA908) Q4275


                                 90                                          100
241 Leu Ser Tyr Phe Ala Trp Pro Leu Tyr Trp Ala Cys Gln Gly Cys Val Leu Thr Gly Val   Fad2-D wt
241 Leu Ser Tyr Phe Ala Trp Pro Leu Tyr Trp Ala Cys Gln Gly Cys Val Leu Thr Gly Val   Fad2-D (GA316) IMC129
241 Leu Ser Tyr Phe Ala Trp Pro Leu Tyr Trp Ala Cys Gln Gly Cys Val Leu Thr Gly Val   Fad2-F wt
241 Leu Ser Tyr Phe Ala Trp Pro Leu Tyr Trp Ala Cys Gln Gly Cys Val Leu Thr Gly Val   Fad2-F (TA515) Q508
241 Leu Ser Tyr Phe Ala Trp Pro Leu Tyr Trp Ala Cys Gln Gly Cys Val Leu Thr Gly Val   Fad2-F (GA908) Q4275


                                 110                                         120
301 Trp Val Ile Ala His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Leu Asp Asp   Fad2-D wt
301 Trp Val Ile Ala His Lys Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Leu Asp Asp   Fad2-D (GA316) IMC129
301 Trp Val Ile Ala His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Leu Asp Asp   Fad2-F wt
301 Trp Val Ile Ala His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Leu Asp Asp   Fad2-F (TA515) Q508
301 Trp Val Ile Ala His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Leu Asp Asp   Fad2-F (GA908) Q4275


                                 130                                         140
361 Thr Val Gly Leu Ile Phe His Ser Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser   Fad2-D wt
361 Thr Val Gly Leu Ile Phe His Ser Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser   Fad2-D (GA316) IMC129
361 Thr Val Gly Leu Ile Phe His Ser Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser   Fad2-F wt
361 Thr Val Gly Leu Ile Phe His Ser Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser   Fad2-F (TA515) Q508
361 Thr Val Gly Leu Ile Phe His Ser Phe Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser   Fad2-F (GA908) Q4275
```

FIG. 3A

```
                        150                        160
421  His Arg Arg His His Ser Asn ⬤r Gly Ser Leu Glu Arg Asp Glu Val Ph⬤ al Pro Lys  Fad2-D wt
421  His Arg Arg His His Ser Asn Thr Gly Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  Fad2-D (GA316) IMC129
421  His Arg Arg His His Ser Asn Thr Gly Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  Fad2-F wt
421  His Arg Arg His His Ser Asn Thr Gly Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  Fad2-F (TA515) Q508
421  His Arg Arg His His Ser Asn Thr Gly Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys  Fad2-F (GA908) Q4275

                        170                        180
481  Lys Lys Ser Asp Ile Lys Trp Tyr Gly Lys Tyr Leu Asn Asn Pro Leu Gly Arg Thr Val  Fad2-D wt
481  Lys Lys Ser Asp Ile Lys Trp Tyr Gly Lys Tyr Leu Asn Asn Pro Leu Gly Arg Thr Val  Fad2-D (GA316) IMC129
481  Lys Lys Ser Asp Ile Lys Trp Tyr Gly Lys Tyr Leu Asn Asn Pro Leu Gly Arg Thr Val  Fad2-F wt.
481  Lys Lys Ser Asp Ile Lys Trp Tyr Gly Lys Tyr His Asn Asn Pro Leu Gly Arg Thr Val  Fad2-F (TA515) Q508
481  Lys Lys Ser Asp Ile Lys Trp Tyr Gly Lys Tyr Leu Asn Asn Pro Leu Gly Arg Thr Val  Fad2-F (GA908) Q4275

                        190                        200
541  Met Leu Thr Val Gln Phe Thr Leu Gly Trp Pro Leu Tyr Leu Ala Phe Asn Val Ser Gly  Fad2-D wt
541  Met Leu Thr Val Gln Phe Thr Leu Gly Trp Pro Leu Tyr Leu Ala Phe Asn Val Ser Gly  Fad2-D (GA316) IMC129
541  Met Leu Thr Val Gln Phe Thr Leu Gly Trp Pro Leu Tyr Leu Ala Phe Asn Val Ser Gly  Fad2-F wt
541  Met Leu Thr Val Gln Phe Thr Leu Gly Trp Pro Leu Tyr Leu Ala Phe Asn Val Ser Gly  Fad2-F (TA515) Q508
541  Met Leu Thr Val Gln Phe Thr Leu Gly Trp Pro Leu Tyr Leu Ala Phe Asn Val Ser Gly  Fad2-F (GA908) Q4275

                        210                        220
601  Arg Pro Tyr Asp Gly Gly Phe Ala Cys His Phe His Pro Asn Ala Pro Ile Tyr Asn Asp  Fad2-D wt
601  Arg Pro Tyr Asp Gly Gly Phe Ala Cys His Phe His Pro Asn Ala Pro Ile Tyr Asn Asp  Fad2-D (GA316) IMC129
601  Arg Pro Tyr Asp Gly Gly Phe Ala Cys His Phe His Pro Asn Ala Pro Ile Tyr Asn Asp  Fad2-F wt
601  Arg Pro Tyr Asp Gly Gly Phe Ala Cys His Phe His Pro Asn Ala Pro Ile Tyr Asn Asp  Fad2-F (TA515) Q508
601  Arg Pro Tyr Asp Gly Gly Phe Ala Cys His Phe His Pro Asn Ala Pro Ile Tyr Asn Asp  Fad2-F (GA908) Q4275

                        230                        240
661  Arg Glu Arg Leu Gln Ile Tyr Ile Ser Asp Ala Gly Ile Leu Ala Val Cys Tyr Gly Leu  Fad2-D wt
661  Arg Glu Arg Leu Gln Ile Tyr Ile Ser Asp Ala Gly Ile Leu Ala Val Cys Tyr Gly Leu  Fad2-D (GA316) IMC129
661  Arg Glu Arg Leu Gln Ile Tyr Ile Ser Asp Ala Gly Ile Leu Ala Val Cys Tyr Gly Leu  Fad2-F wt
661  Arg Glu Arg Leu Gln Ile Tyr Ile Ser Asp Ala Gly Ile Leu Ala Val Cys Tyr Gly Leu  Fad2-F (TA515) Q508
661  Arg Glu Arg Leu Gln Ile Tyr Ile Ser Asp Ala Gly Ile Leu Ala Val Cys Tyr Gly Leu  Fad2-F (GA908) Q4275

                        250                        260
721  Tyr Arg Tyr Ala Ala Val Gln Gly Val Ala Ser Met Val Cys Phe Tyr Gly Val Pro Leu  Fad2-D wt
721  Tyr Arg Tyr Ala Ala Val Gln Gly Val Ala Ser Met Val Cys Phe Tyr Gly Val Pro Leu  Fad2-D (GA316) IMC129
721  Phe Arg Tyr Ala Ala Ala Gln Gly Val Ala Ser Met Val Cys Phe Tyr Gly Val Pro Leu  Fad2-F wt
721  Phe Arg Tyr Ala Ala Ala Gln Gly Val Ala Ser Met Val Cys Phe Tyr Gly Val Pro Leu  Fad2-F (TA515) Q508
721  Phe Arg Tyr Ala Ala Ala Gln Gly Val Ala Ser Met Val Cys Phe Tyr Gly Val Pro Leu  Fad2-F (GA908) Q4275

                        270                        280
781  Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu Gln His Thr His Pro Ser Leu  Fad2-D wt
781  Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu Gln His Thr His Pro Ser Leu  Fad2-D (GA316) IMC129
781  Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu Gln His Thr His Pro Ser Leu  Fad2-F wt
781  Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu Gln His Thr His Pro Ser Leu  Fad2-F (TA515) Q508
781  Leu Ile Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu Gln His Thr His Pro Ser Leu  Fad2-F (GA908) Q4275
```

FIG. 3B

```
                                    290                        300
841  Pro His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg   Fad2-D wt
841  Pro His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg   Fad2-D (GA316) IMC129
841  Pro His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg   Fad2-F wt
841  Pro His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg   Fad2-F (TA515) Q508
841  Pro His Tyr Asp Ser Ser Glu Trp Asp Trp Leu Arg Gly Ala Leu Ala Thr Val Asp Arg   Fad2-F (GA908) Q4275


                                    310                        320
901  Asp Tyr Gly Ile Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Ala His His   Fad2-D wt
901  Asp Tyr Gly Ile Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Ala His His   Fad2-D (GA316) IMC129
901  Asp Tyr Gly Ile Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Ala His His   Fad2-F wt
901  Asp Tyr Gly Ile Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Ala His His   Fad2-F (TA515) Q508
901  Asp Tyr Glu Ile Leu Asn Lys Val Phe His Asn Ile Thr Asp Thr His Val Ala His His   Fad2-F (GA908) Q4275


                                    330                        340
961  Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile Lys Pro Ile   Fad2-D wt
961  Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile Lys Pro Ile   Fad2-D (GA316) IMC129
961  Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile Lys Pro Ile   Fad2-F wt
961  Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile Lys Pro Ile   Fad2-F (TA515) Q508
961  Leu Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile Lys Pro Ile   Fad2-F (GA908) Q4275


                                    350                        360
1021 Leu Gly Glu Tyr Tyr Gln Phe Asp Gly Thr Pro Val Val Lys Ala Met Trp Arg Glu Ala   Fad2-D wt
1021 Leu Gly Glu Tyr Tyr Gln Phe Asp Gly Thr Pro Val Val Lys Ala Met Trp Arg Glu Ala   Fad2-D (GA316) IMC129
1021 Leu Gly Glu Tyr Tyr Gln Phe Asp Gly Thr Pro Val Val Lys Ala Met Trp Arg Glu Ala   Fad2-F wt
1021 Leu Gly Glu Tyr Tyr Gln Phe Asp Gly Thr Pro Val Val Lys Ala Met Trp Arg Glu Ala   Fad2-F (TA515) Q508
1021 Leu Gly Glu Tyr Tyr Gln Phe Asp Gly Thr Pro Val Val Lys Ala Met Trp Arg Glu Ala   Fad2-F (GA908) Q4275


                                    370                        380
1081 Lys Glu Cys Ile Tyr Val Glu Pro Asp Arg Gln Gly Glu Lys Lys Gly Val Phe Trp Tyr   Fad2-D wt
1081 Lys Glu Cys Ile Tyr Val Glu Pro Asp Arg Gln Gly Glu Lys Lys Gly Val Phe Trp Tyr   Fad2-D (GA316) IMC129
1081 Lys Glu Cys Ile Tyr Val Glu Pro Asp Arg Gln Gly Glu Lys Lys Gly Val Phe Trp Tyr   Fad2-F wt
1081 Lys Glu Cys Ile Tyr Val Glu Pro Asp Arg Gln Gly Glu Lys Lys Gly Val Phe Trp Tyr   Fad2-F (TA515) Q508
1081 Lys Glu Cys Ile Tyr Val Glu Pro Asp Arg Gln Gly Glu Lys Lys Gly Val Phe Trp Tyr   Fad2-F (GA908) Q4275



1141 Asn Asn Lys Leu ter                                       Fad2-D wt
1141 Asn Asn Lys Leu ter                                       Fad2-D (GA316) IMC129
1141 Asn Asn Lys Leu ter                                       Fad2-F wt
1141 Asn Asn Lys Leu ter                                       Fad2-F (TA515) Q508
1141 Asn Asn Lys Leu ter                                       Fad2-F (GA908) Q4275
```

FIG. 3C